

DISCUSSION OF THE AMENDMENT

Due to the length of the specification herein, Applicants will cite to the paragraph number of the published patent application (PG Pub) of the present application, i.e., US 2005/0272910, when discussing the application description, both in this section and in the Remarks section, *infra*, rather than to page and line of the specification as filed.

New Claims 9-15 have been added. Claims 9-11 are supported in the specification at paragraph [0020]. Claims 12-13 are supported in the specification at paragraph [0021]. Claims 14-15 are supported in the specification at paragraph [0022].

No new matter is believed to have been added by the above amendment. Claims 1-15 are now pending in the application. All claims are active except Claims 7 and 8, which stand withdrawn from consideration.

REMARKS

The rejection of Claims 1-6 under 35 U.S.C. § 103(a) as unpatentable over US 5,449,810 (Biskup et al), is respectfully traversed.

As recited in Claim 1, an embodiment of the present invention is a process for preparing aromatic diisocyanate by reacting a phosgene with a diamine in the gas phase, wherein the reaction is carried out in a reaction zone in which **the pressure is more than 3 bar and less than 20 bar** and the temperature in the reaction zone is from more than 200°C to less than 600°C.

(Emphasis added.)

Biskup et al discloses a process for the preparation of aromatic diisocyanates by phosgenation of the corresponding diamines in the gas phase, wherein the reactants are mixed such that the flow of the gaseous reaction mixture is plug flow without back-mixing through a reactor, which is essential to the process of their invention (column 5, lines 5-7), which flow is ensured by a difference in pressure between the product feed pipes leading to a mixing aggregate and the outlet for a condensation step which occurs following the reaction (column 5, lines 7-11), wherein in general, the pressure in the feed pipes leading to the mixing aggregate lies within the range of from 200 to 3000 mbar, and the pressure downstream of the condensation step lies within the range of from 150 to 2000 mbar, and that it is essential that the pressure differential be maintained for the purpose of ensuring the stated directional flow (column 5, lines 11-18).

The Examiner finds that the pressure of the reaction medium is expected to be in between the pressure in the feed pipes and the pressure downstream in the condensation step, and concludes therefrom that “the pressure conditions in the claimed range and the prior art range are close enough (2-3 bar upper limit in the prior art versus 3 bar claimed lower limit)

that one skilled in the art would expect them to have the same properties.” The Examiner then holds that the presently-claimed invention is *prima facie* obvious over Biskup et al.

In reply, Applicants agree that the pressure in the reaction zone in Biskup et al would be in between the pressure in the feed pipes and the pressure downstream in a condensation step. However, Applicants do not agree that a minimum pressure herein of **more than 3 bar** is *prima facie* obvious over a pressure that is **necessarily less than 3 bar**. Moreover, the maximum pressure in any of the examples of Biskup et al is 820 mbar (column 6, line 7), which is substantially less than the minimum pressure of more than 3 bar herein. Clearly, Biskup et al provides **no** motivation to employ a pressure in their feed pipes leading to their mixing aggregate of more than 3000 mbar (3 bar), given the expected added expense in operating at an even higher pressure.

In addition, applying increased pressure leads to an increased space time yield and allows a production plant which contains very little phosgene, as described in the specification at paragraphs [0006]-[0008]. Due to the reduced space required by the gases at higher pressures, smaller devices can be used and a higher concentration in the gas phase can be achieved. A general disadvantage of higher pressures is that generally higher temperatures are needed to evaporate the amines used, which could lead to degradation of the amines. Therefore a person skilled in the art would have tried to reduce the temperature needed to evaporate the amines by reducing the pressure in the plant.

The present inventors have shown that by increasing the pressure in the plant, the above-described advantages as increased space time yield and a production plant which contains very little phosgene can be achieved but also, and surprisingly, the above-described disadvantages do not occur, i.e., the yield compared to Biskup et al has surprisingly not been reduced. This is borne out by comparing the presently-disclosed examples with those of Biskup et al. Thus, Example 1 and 2 from Biskup et al show a yield for toluene diisocyanate

(TDI) of 99.3 % and 99.1%, respectively, at a pressure on the order of 0.8 bar, while present Example 1 shows a comparable yield for TDI at a pressure of 10 bar of 99.2 %. Similar results are obtained for methylenedi(phenyl isocyanate) (MDI). Compare Example 5 of Biskup et al, which shows a yield of 99.1% at a pressure on the order of 0.6 bar, to present Example 2, which shows a comparable yield of 99.3% at a pressure of 5 bar. Such results could not have been predicted from Biskup et al.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

Applicants respectfully submit that all of the presently-active claims in this application are now in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.


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Respectfully submitted,

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